

## THE SOIL AND THE CROPS.

In the October, November, and December numbers of the report for the North Dakota section, Mr. B. H. Bronson publishes some studies in meteorology by Prof. E. F. Ladd, from which we make the following compilation showing the mean temperature of the soil at the depth of 1 inch and 12 inches, the percentage of water in the first foot of soil during the months of the growing season, and finally the average yield per acre in bushels.

This table does not show any simple relation between soil and crop but stimulates further study of the subject.

*Soil and crop at Agricultural College, North Dakota.*

Year.	May.			June.			July.			August.			September.			October.		
	Mean soil.			Mean soil.			Mean soil.			Mean soil.			Mean soil.			Mean soil.		
	Temperature, 1 inch.	Temperature, 12 inches.	Moisture, per cent.	Temperature, 1 inch.	Temperature, 12 inches.	Moisture, per cent.	Temperature, 1 inch.	Temperature, 12 inches.	Moisture, per cent.	Temperature, 1 inch.	Temperature, 12 inches.	Moisture, per cent.	Temperature, 1 inch.	Temperature, 12 inches.	Moisture, per cent.	Temperature, 1 inch.	Temperature, 12 inches.	Moisture, per cent.
1892.....	48.3	39.4	35	66.5	53.9	30	75.0	69.6	28	72.4	64.0	30	65.5	58.0	28	51.6	51.8	19
1893.....	52.3	38.7	31	69.6	55.6	23	74.9	63.9	28	77.0	63.7	22	68.9	59.7	15	47.2	46.6	24
1894.....	58.1	47.3	28	71.5	60.1	18	73.4	65.3	17	75.0	64.8	10	69.8	58.1	12	42.0	47.3	27
1895.....	62.0	48.1	24	66.0	56.9	22	71.2	62.6	23	77.8	63.3	16	69.2	58.6	19	53.2	47.4	16
1896.....	59.5	47.6	30	65.1	57.3	25	75.9	63.1	12	76.5	63.3	17	60.1	55.7	26	46.8	46.5	12
1897.....	60.0	43.5	...	63.4	53.6	...	72.7	62.9	...	72.7	62.9	...	72.6	61.3	...	50.6	52.2	...
1898.....	56.5	43.0	...	67.4	56.4	...	77.0	63.9	...	73.1	63.4	...	65.5	58.3	...	46.2	47.7	...

Year.	Crop yield, bushels per acre.			
	Wheat.			Oats.
	Experiment plots.	Agricultural farm.	Cass County.	Agricultural farm.
1892.....	19.4	18.6	13.3	36.4
1893.....	9.1	13.7	9.8	31.6
1894.....	18.9	20.7	14.0	59.3
1895.....	23.4	31.4	18.9	50.4
1896.....	16.4	12.6	11.5	49.5
1897.....	13.2	10.5	10.5	39.3
1898.....	22.9	24.3	15.0	70.5

## ERRORS IN SCHOOL BOOKS.

According to the November report of the Oregon section the following remarkable statement relative to the climate of Montana appears in the geography adopted by the legislature for the use of the public schools in that State.

"The warm winds known as the chinook winds, from the Pacific, heated by the Japan current, may spring up even in the coldest weather." A gentleman living in Montana writes as follows: "As the Japan current has about as much to do with the climate of Montana. \* \* \* I think the time has arrived to obliterate these errors." Mr. B. S. Pague very properly adds: "The root of the evil is to be found in school text-books and in the ideas of the instructors."

In a recent pamphlet issued by Mr. Pague he has endeavored to educate the people to a more correct view of the dry chinook winds of Montana, which are certainly not due to the Kuroshio or Japan current, nor to any specific influence of the Pacific Ocean, but represent merely one of many cases in which descending air is warmed by compression.

In general, errors that have once been introduced into school text-books are very apt to stick there, and also in the

minds of the scholars and give rise to a fine crop of other errors in future years. Not a day passes but what the Weather Bureau observers throughout the country have to answer a thousand questions suggested by erroneous views disseminated in the school books used in the childhood of the present generation. Even the best of publishers who sends his proof sheets to some Weather Bureau official for revision will occasionally hesitate to cut out a paragraph or alter an expression that seems to him likely to be popular and taking with the people. It is generally said that the text-book which is intended to be committed to memory must not contain anything above the comprehension or contrary to the views of the teacher, since the latter must always be ready to satisfactorily answer the questions of the more intelligent pupils. The teacher is always in a dilemma when he dares to question the text-book and must explain to the scholars, and especially to the school trustees, how he knows that the text-book is wrong. There is a halo around the author's name on the title page of the text-book. He is the authority and not the teacher. His book has been adopted by the State board or the local school board; it has a hundred complimentary letters from distinguished reviewers, and woe to the teacher who impugns its authority or correctness. The true remedy for it all is to insist that every author or publisher shall revise the text-book, no matter at how great an expense, and thus endeavor to keep it abreast with the progress of the times.

Some teachers adopt the rule that the text-book must be used as an authority for dates and facts, but that the author's explanations of the reasons why and his comments on matters of politics or finance may be wholly omitted and replaced by the better personal knowledge of the teacher. In scientific matters this is a safe rule, especially if the teacher is wise enough to point out those cases in which our knowledge is still so unsatisfactory that we are not justified in giving any authoritative explanation.

## FRUIT PROTECTION IN FLORIDA.

In the November report of the Florida section, Mr. A. J. Mitchell, writes as follows:

No specious argument is necessary to show that the Florida fruit grower has an abiding faith in the future of orange culture. As a result of the severe freeze of last winter many ingenious devices have been evolved with a view to protecting fruit trees and pineapples. Some of these measures are of undoubted utility; the merits of others are, as yet, problematical. History proves that in every crisis the skill and intelligence of man have been such as to circumvent continued disaster. And so it is with fruit growing in portions of north-central Florida. Previous to 1895 there had been no occasion for considering extreme protective measures. The necessity of preparing for cold weather, however, has now taken such a firm hold upon our fruit growers that thousands of dollars were expended during the past summer with a view to affording ample safety to crops. It is certain that no farmer ever faced disaster with more fortitude than did the Florida horticulturist, and the severe test only stimulated his determination to overcome all difficulties.

A visit through the orange belt of the State would be a revelation to those who, previous to 1895, were familiar with groves developed under normal winter conditions. A suggestion at that time that orange culture would ever require "house protection" would have been regarded as the idle vaporings of the irresponsible. The measures usually adopted are such as to protect against the severest conditions, hence we find hundreds of acres completely inclosed and covered with cypress strips. Nearly all coverings are so arranged as to be readily removed or adjusted so as to admit the sunlight. There seems to be a diversity of opinion regarding the superiority of the shed inclosure as compared with the tent. In both cases provision is made for the use of lamps, one to each tree, or salamanders filled with coke. It is well to add here that these preparations are largely confined to north-central Florida, which, previous to 1895, was the orange belt of the State. In southern counties ordinary fires are regarded as sufficient to meet all exigencies. Many groves, some containing 35 acres, have been covered at a cost of \$400 or \$500 per acre. The interest manifested and

expense incurred show that citrus fruit growing will be rapidly restored to its former prestige.

When writing the above Mr. Mitchell could hardly have anticipated that the month of February, 1900, would have brought to Florida a freeze almost as severe as that of February, 1899. The morning reports for February 19 show a minimum of 28° at Jupiter, so that undoubtedly freezing weather prevailed from latitude 26° northward throughout the Peninsula. There certainly have been a number of severe freezes in Florida during the past six years, but we believe that the time will soon come when there will be a temporary let up on severe blizzards, but even if they should continue, there is no reason to doubt but what agriculture in Florida can be made profitable by the proper use of protective devices.

#### HISTORICAL EVENTS IN METEOROLOGY.

In the report of the New Mexico section for November, 1899, Mr. R. M. Harding gives an interesting list of historic cold winters, mostly in Europe. It would be a welcome contribution to American meteorology if our section directors and observers would overhaul files of newspapers, magazines, and ancient manuscript records, and also by conversation with the oldest inhabitants, collect the rapidly disappearing records of the weather in their respective States. At the close of Mr. Harding's list, he says:

In 1863-64 a severe cold wave swept over the whole of North America. The thermometer went to 60° below zero in the Northwest. The Mississippi River was blocked with ice in a single night, and in twelve hours froze from St. Paul, Minn., to Cairo, Ill.

#### IRRIGATION IN WINTER.

In the November report of the Arizona section Mr. W. G. Burns, Section Director, publishes a short article by Prof. A. J. McClatchie on the effect of winter irrigation of an orchard. Of course, the ordinary custom of the farmer is to delay irrigation until drought threatens the welfare of plants or crops. In the present case it was proposed to anticipate the light rains and droughts of the dry season by saturating the soil during the winter, or rainy season, when water is usually abundant. Professor McClatchie irrigated an isolated peach and apricot orchard by the furrow system eight times between December and March; the surface soil was cultivated twice when it became dry, and also plowed and harrowed once after the irrigation. The moisture content of the soil was determined by examining samples at each foot from the surface down to the ground water during April, May, June, and September, and by following the roots it was shown that the water, to a depth of 20 feet, was utilized by the trees. In general the roots passed downward through 10 feet of gravel and 4 feet of clay. The samples indicated that the irrigating water penetrated to a depth of 24 feet. The moisture increased down to the 16th foot, then it diminished to the 26th foot, then increased again until ground water was reached at 34 feet. A second set of samples, taken in May, showed that the capillary action upward had about kept pace with the evaporation. The third set of samples, taken in June, showed that the upper 5 feet had become quite dry, but there was still plenty of water within reach of the deeper roots. The fourth samples, taken in September, showed that the upper 15 feet were comparatively dry, but the lower extremities of the roots were still surrounded by the moist soil. The trees grew thriftily, were well loaded with fruit of excellent quality, and at the close of the season were in fine condition, although they had received but one irrigation since March.

The general result of this experiment shows the importance of irrigating very early and, in fact, throughout the winter, thereby dispensing with the labor of irrigation during the summer and utilizing to the utmost the winter rain and melted snow in the arid region of the United States.

#### THE WEATHER BUREAU AND COMMERCE ON THE GREAT LAKES.

In the December report of the Michigan section, Mr. C. F. Schneider, Section Director, gives a number of items relative to the navigation of the Great Lakes during 1898 and 1899, from which we take the following:

Number of vessels, 20,255; number of passages during the season, through the Detroit River, either way, 22,741; number of passengers, 49,082; bushels of wheat, 58,397,355; barrels of flour, 7,114,147; tons of iron ore, 15,328,240; feet of lumber, board measure, 1,038,077,000. There are about as many clearances of vessels at lake ports as there are from all the seaports of the United States combined.

The Weather Bureau furnished the masses of vessels passing Detroit 16,200 weather maps and 22,500 weather forecasts, storm warnings and special afternoon reports of the wind. No vessel of importance passes Detroit without getting its weather map and forecasts.

The astonishing importance of the commerce of the Great Lakes depends partly upon the fact that so many vessels leave the lake ports directly for Europe and Asia. During the nine months of the year when the Sault Ste. Marie Ship Canal is open to navigation two and a half times as much tonnage passes through it as passes the Suez Canal during the entire twelve months. The registered tonnage passing Detroit during the nine months is more than that of New York, London, and Liverpool combined. The fact that the merchandise is largely wheat, flour, iron, and lumber, instead of silks and teas and manufactures of all kinds, does not in the least diminish its importance or the responsibility of the Weather Bureau in regard to this commerce.

#### MIRAGE.

In the January report of the South Dakota section, Mr. S. W. Glenn, Section Director, says:

The observer at Desmet reports an unusually strong mirage in that vicinity on December 21, 1899. The town lies just north of a considerable rise in the prairie, which shuts it from view to persons approaching from the south. The observer says: "To persons south of the town the hills appeared to vanish and Desmet could be plainly seen, apparently up in the air."

#### THE HIGH STATIONS OF WYOMING.

The November report of the Wyoming section contains a chart showing graphically the monthly precipitation at Cheyenne from 1871 to 1899, inclusive, in which the large percentage during the months of April, May, June, July, and occasionally August, stand out very prominently. Cheyenne has always been considered one of the high stations of the Weather Bureau service. For a long time it and Mount Washington were our only important high stations. Although Cheyenne is but a little lower than Mount Washington, yet it is essentially on a plain or high plateau and not a mountain top. The November report shows that Wyoming has 5 stations between 4,000 and 5,000 feet; 7 stations between 5,000 and 6,000 feet; 10 stations between 6,000 and 7,000 feet; one between 7,000 and 8,000, and 2 between 8,000 and 9,000, with 6 other stations whose elevations are not given in this number of the report, although doubtless they could be estimated accurately to within 100 feet.

The climate of a high plateau offers many interesting peculiarities. Both the diurnal and the annual variations of the various meteorological elements differ entirely from those in the plains near sea level. The fact that the high land is in the interior of a large continent adds another important con-